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EXAMINER	
ODOM, CURTIS B	
ART UNIT	**PAPER NUMBER**
2611	

DATE MAILED: 12/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/627,573	Applicant(s) LIANG, HAIXIANG
	Examiner Curtis B. Odom	Art Unit 2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 October 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *10-25,27-29,31 and 32* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *10-25,27-29,31 and 32* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 10/2/2006 have been fully considered but they are not persuasive. Applicant states that Zhang et al. (U. S. Patent No. 6, 721, 273) and Krishnan et al. (U. S. Patent No. 6, 301, 296) do not disclose "a sequence of symbols, the sequence organized to place a positive and a negative instance of each symbol from a predetermined set of symbols in each phase to allow detection of potential impairments of a plurality of periods in each of the N phases".

However, Zhang et al. clearly discloses a sequence of symbols (DIL as described in column 5, lines 45-column 6, line 7 and column 9, lines 12-48), the sequence organized to place an instance of each symbol (training symbols) from a predetermined set of symbols (wherein Ucodes are the predetermined set of symbols) in each phase (column 9, lines 40-48) to allow detection of the potential impairments in each of the N phases, (wherein B_i^1 is an instance of each symbol from a predetermined set of symbols in each phase as shown is column 9, lines 12-48, which allows detection of the potential impairments (RBS); B_i^1 representing magnitude/PCM level estimates used to calculate the presence of potential impairment as described in column 5, lines 13-44 and column 9, lines 40-55). Zhang et al further discloses the potential impairment RBS is periodic and affects a transmitted sequence of digital symbols in a periodic manner based on a period of the symbols (se column 5, lines 20-25). Furthermore, Zhang et al. discloses detection of the potential RBS impairments based on periods of six symbols for each RBS phase

(column 5, lines 35-44) by estimating sample magnitudes to populate a matrix for creating the DIL sequence. Krishnan et al. further discloses creating a DIL sequence (Fig. 2, column 6, line 53-column 7, line 45) which includes a sequence of symbols (Fig. 2, column 6, lines 57-58, training amplitude (symbols)) organized to place a positive and negative instance of each symbol (Fig. 2, positive and negative training symbols) from a predetermined set of symbols (column 7, line 66-column 8, line 8, wherein the training symbols are selected from a predetermined set of symbols (Ucodes)) in each phase (see Fig. 2, wherein each slot represents a phase) to detect RBS (see column 8, lines 51-59) which is a periodic digital impairment as disclosed by Zhang et al. Therefore, it is the understanding of the examiner that based on the above disclosure that Zhang et al. and Krishnan et al. do in fact discloses detecting potential impairments based on a plurality of periods.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 10-25, 27, 31, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. (previously cited in Office Action 5/5/2004) in view of Krishnan et al. (previously cited in Office Action 11/7/2003).

Regarding claim 10, Zhang et al. discloses a communication system susceptible to one or more potential impairments (Fig. 1) each periodic in an integer number of symbols transmitted across a communications channel (column 5, lines 13-44), the communication system comprising:

a receiver (Figs. 3-6, column 5, line 45-column 6, line 7) to receive an impairment compensation sequence (Digital Impairment Learning Sequence), the impairment compensation sequence including:

N phases (column 9, lines 12-48), wherein N is selected such that each potential impairment, if present, is periodic therein, wherein the DIL sequences contain six phases representative of the phases a potential RBS impairment (column 5, lines 36-44);

a sequence of symbols (DIL as described in column 5, lines 45-column 6, line 7 and column 9, lines 12-48), the sequence organized to place an instance of each symbol (training symbols) from a predetermined set of symbols (wherein Ucodes are the predetermined set of symbols) in each phase (column 9, lines 40-48) to allow detection of potential RBS impairments in each or N phases (wherein B_i^l is an instance of each symbol from a predetermined set of symbols in each phase as shown is column 9, lines 12-48, which allows detection of the potential impairments), wherein the RBS impairments are periodic and affect a transmitted sequence of digital symbols in a periodic manner based on a period of the symbols (se column 5, lines 20-25), wherein detection of the potential RBS impairments is based on periods of six symbols for each RBS phase (column 5, lines 35-44) by estimating sample magnitudes to populate a matrix for creating the DIL sequence; B_i^l representing magnitude/PCM level estimates used to calculate

the presence of potential impairment as described in column 5, lines 13-44 and column 9, lines 40-55); and

an equalizer (Fig. 4, column 5, lines 24-34 and column 6, lines 29-44) to equalize the impairment compensation sequence, the equalizer producing amplitude estimates of the sequence of symbols, wherein the equalizer creates magnitude estimates (Fig. 4) which are representative of amplitude estimates of the sequence of symbols.

Zhang et al. does not disclose the sequence of symbols is organized to place a positive and negative instance of each symbol from a predetermined set of symbols in each phase to allow detection of the potential impairment of each phase.

However, Krishnan et al. also discloses creating a DIL sequence (Fig. 2, column 6, line 53-column 7, line 45) which includes a sequence of symbols (Fig. 2, column 6, lines 57-58, training amplitude (symbols)) organized to place a positive and negative instance of each symbol (Fig. 2, positive and negative training symbols) from a predetermined set of symbols (column 7, line 66-column 8, line 8, wherein the training symbols are selected from a predetermined set of symbols (Ucodes)) in each phase (Fig. 2, wherein each slot represents a slot (phase) of RBS, see column 6, lines 30-44 and column 1-12) to allow detection of the potential RBS impairment of each phase (slot) (see column 8, lines 51-59).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the DIL sequence of the Zhang et al. with the teachings of Krishnan et al. to include both positive and negative training symbols in each phase of the DIL sequence since Krishnan et al. states the DIL sequence can be used to detect digital impairments such as RBS

(column 7, lines 11-12) in order to create optimum signal constellations for data transfer (column 6, lines 45-51).

Regarding claim 11, which inherits the limitations of claim 10, Zhang et al. discloses the sequence includes a number of segments, the number corresponding to a number of elements in the predetermined set of symbols (column 5, line 13-column 6, line 44, column 9, lines 17-30, and column 10, lines 45-65).

Regarding claim 12, which inherits the limitations of claim 10, Zhang et al. discloses the potential impairments include at least one of RBS, padding, and a combination of RBS and padding (column 5, lines 13-44).

Regarding claim 13, which inherits the limitations of claim 10, Zhang et al. disclose the predetermined set of symbols includes at least a subset of a universal PCM codeword set (column 6, lines 3-67).

Regarding claim 14, which inherits the limitations of claim 10, Zhang et al. discloses the N phases could include 24 time phases (column 5, lines 13-24, column 6, lines 29-44), wherein M represents the number of phases.

Regarding claim 15, which inherits the limitations of claim 10, Zhang et al. discloses N is at least a common multiple of respective periods of each of the potential impairments (column 5, lines 13-24, column 6, lines 29-44 and column 9, lines 13-48), wherein M is a common multiple of respective periods of each of the potential RBS impairments.

Regarding claim 16, which inherits the limitations of claim 10, Zhang et al. discloses the sequence is organized to place at least two instances of the symbol from the predetermined set of symbols in each phase (column 9, lines 17-30, wherein at least two instances of the training

symbol B_i^l are placed in each phase of the DIL sequences) but does not disclose an average of received values corresponding to the at least two instances improving an estimation of the symbol.

However, Krishnan et al. also discloses averaging the training symbols for each phase (slot) to produce values used to detect a digital impairment (column 7, lines 3-12). Therefore, it would have been obvious to include this feature since Krishnan et al. states that detecting digital impairments can be used to create optimum signal constellations for data transfer (column 6, lines 45-51).

Regarding claim 17, Zhang et al. discloses a receiver (Figs. 3-6) for receiving data over a communications channel susceptible to one or more potential impairments each periodic in an integer number of symbols transmitted across a communications channel (column 5, lines 13-44), the receiver comprising:

a device to receive an impairment compensation sequence including:

N phases (column 9, lines 12-48), wherein N is selected such that each potential impairment, if present, is periodic therein, wherein the DIL sequences contain six phases representative of the phases a potential RBS impairment (column 5, lines 36-44);

a sequence of amplitudes (DIL as described in column 5, lines 45-column 6, line 7 and column 9, lines 12-48), the sequence organized to place an instance of each symbol (training symbols) from a predetermined set of symbols (wherein Ucodes are the predetermined set of symbols) in each phase (column 9, lines 40-48) to allow detection of potential RBS impairments in each or N phases (wherein B_i^l is an instance of each symbol from a predetermined set of symbols in each phase as shown is column 9, lines 12-48, which allows detection of the potential

impairments), wherein the RBS impairments are periodic and affect a transmitted sequence of digital symbols in a periodic manner based on a period of the symbols (se column 5, lines 20-25), wherein detection of the potential RBS impairments is based on periods of six symbols for each RBS phase (column 5, lines 35-44) by estimating sample magnitudes to populate a matrix for creating the DIL sequence; B_i^l representing magnitude/PCM level estimates used to calculate the presence of potential impairment as described in column 5, lines 13-44 and column 9, lines 40-55); and

a decoder (Fig. 3, block 304) for decoding the sequence of amplitudes.

Zhang et al. does not specifically disclose a demodulator for demodulating a modulated impairment compensation sequence or the sequence of symbols is organized to place a positive and negative instance of each symbol from a predetermined set of symbols in each phase to allow detection of the potential impairment of each phase. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the demapper (Fig. 3, block 308) of Zhang et al. could have been considered a demodulator since its demaps symbols mapped at the transmitter to recover an original bit stream (column 5, lines 4-11). Thus, the demapper of Zhang et al. can be considered a functional equivalent of the demodulator of the present application.

Krishnan et al. also discloses creating a DIL sequence (Fig. 2, column 6, line 53-column 7, line 45) which includes a sequence of symbols (Fig. 2, column 6, lines 57-58, training amplitude (symbols)) organized to place a positive and negative instance of each symbol (Fig. 2, positive and negative training symbols) from a predetermined set of symbols (column 7, line 66-column 8, line 8, wherein the training symbols are selected from a predetermined set of symbols

(Ucodes)) in each phase (Fig. 2, wherein each slot represents a slot (phase) of RBS, see column 6, lines 30-44 and column 1-12) to allow detection of the potential RBS impairments of each phase (slot) (see column 8, lines 51-59).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the DIL sequence of the Zhang et al. with the teachings of Krishnan et al. to include both positive and negative training symbols in each phase of the DIL sequence since Krishnan et al. states the DIL sequence can be used to detect digital RBS impairments (column 7, lines 11-12) in order to create optimum signal constellations for data transfer (column 6, lines 45-51).

Regarding claim 18, Zhang et al. discloses a method of establishing communication across a channel, the communication susceptible to one or more potential impairments each periodic in an integer number of symbols (column 5, lines 13-44), the method comprising:

receiving (Figs. 3-6, column 5, line 45-column 6, line 7) a sequence of symbols (DIL as described in column 5, lines 45-column 6, line 7 and column 9, lines 12-48), the sequence organized to place an instance of each symbol (training symbols) from a predetermined set of symbols (wherein Ucodes are the predetermined set of symbols) in each of the N phases (column 9, lines 40-48) to allow detection of the potential impairments in each of the N phases, (wherein B_i^l is an instance of each symbol from a predetermined set of symbols in each phase as shown is column 9, lines 12-48, which allows detection of the potential impairments (RBS); B_i^l representing magnitude/PCM level estimates used to calculate the presence of potential impairment as described in column 5, lines 13-44 and column 9, lines 40-55), wherein N is selected such that each potential impairment, if present, is periodic therein, wherein the DIL

sequences contain six phases representative of the phases a potential RBS impairment (column 5, lines 36-44); and

detecting potential RBS impairments (column 5, lines 35-44), if present, corresponding to each of the N phases based on the sequence of symbols (column 6, lines 29-column 8, line 59, wherein RBS is detected as described in column 5, lines 35-44 in each phase using the DIL sequence and procedure described in column 6, line 29-column 8, line 59 and column 9, lines 5-60), wherein the RBS impairments are periodic and affect a transmitted sequence of digital symbols in a periodic manner based on a period of the symbols (se column 5, lines 20-25), wherein detection of the potential RBS impairments is based on periods of six symbols for each RBS phase (column 5, lines 35-44) by estimating sample magnitudes to populate a matrix for creating the DIL sequence.

Zhang et al. does not disclose the sequence of symbols is organized to place a positive and negative instance of each symbol from a predetermined set of symbols in each phase to allow detection of the potential impairment of each phase.

However, Krishnan et al. also discloses creating a DIL sequence (Fig. 2, column 6, line 53-column 7, line 45) which includes a sequence of symbols (Fig. 2, column 6, lines 57-58, training amplitude (symbols)) organized to place a positive and negative instance of each symbol (Fig. 2, positive and negative training symbols) from a predetermined set of symbols (column 7, line 66-column 8, line 8, wherein the training symbols are selected from a predetermined set of symbols (Ucodes)) in each phase (Fig. 2, wherein each slot represents a slot (phase) of RBS, see column 6, lines 30-44 and column 1-12) to allow detection of the potential RBS impairment of each phase (slot) (see column 8, lines 51-59).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to modify the DIL sequence of the Zhang et al. with the teachings of Krishnan et al. to include both positive and negative training symbols in each phase of the DIL sequence since Krishnan et al. states the DIL sequence can be used to detect digital RBS impairments (column 7, lines 11-12) in order to create optimum signal constellations for data transfer (column 6, lines 45-51).

Regarding claim 19, which inherits the limitations of claim 19, Zhang et al. discloses the channel includes a digital portion of a PSTN and wherein the potential impairments include at least one of RBS, padding, and a combination of RBS and padding in the digital portion of the PSTN (Fig. 1, column 1, line 20-column 2, line 53).

Regarding claim 20, which inherits the limitations of claim 18, Zhang et al. discloses the sequence of symbols is a DIL sequence (column 6, lines 51-66 and column 9, lines 14-30).

Regarding claims 21-24, the claimed method includes features corresponding to subject matter mentioned above in the rejection of claims 11, 13, 15 and 16 which is applicable hereto.

Regarding claim 25, which inherits the limitation of claim 24, Zhang et al. discloses the subset (Ucodes) is selected in accordance with power constraints (column 6, lines 10-17).

Regarding claim 27, which inherits the limitations of claim 18, Zhang et al. discloses the sequence of symbols is compatible with a plurality of equalizers (Figs. 3-6), the plurality of equalizers including partial response type equalizer structures (column 4, lines 27-48 and column 6, lines 29-44).

Regarding claim 31, which inherits the limitations of claim 10, Zhang et al. discloses the predetermined set includes two or more symbols (column 5, line 45-column 6, line 7), wherein Ucodes contain a plurality of symbols.

Regarding claim 32, which inherits the limitations of claim 31, Zhang et al. discloses the impairment compensation sequence includes a plurality of segments and each segment includes N phases (column 5, lines 13-52), wherein N=6 and the number of segments can be between 0 and 255.

4. Claims 28 and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhang et al. (previously cited in Office Action 5/5/2004) in view of Krishnan et al. (previously cited in Office Action 11/7/2003) as applied to claim 10, and in further view of Langberg et al. (previously cited in Office Action 5/5/2004).

Regarding claim 28, Zhang et al. and Krishnan et al. disclose all of the subject matter as described in the previous rejection (see rejection of claim 10), except for the method executed by the device written as a computer program product with a computer readable storage medium.

However, Langberg et al. teaches that the method and apparatus for a transceiver warm start activation procedure with precoding can be implemented in software stored in a computer-readable medium. The computer readable medium is an electronic, magnetic, optical, or other physical device or means that can contain or store a computer program for use by or in connection with a computer-related system or method (note column 3, lines 51-65). One skilled in the art at the time the invention was made would have clearly recognized that the method of Zhang et al. and Krishnan et al. would have been implemented into software. The implemented software would perform the same function of the hardware for less expense, greater adaptability,

and greater flexibility. Therefore, it would have been obvious to have used the software in Zhang et al. and Krishnan et al. as taught by Langberg et al. in order to reduce cost and improve the adaptability and flexibility of the communication system.

Regarding claim 29, which inherits the limitations of claim 28, Zhang et al. further discloses the data is encoded by or transmitted in at least one computer readable medium selected from the set of a disk, tape, or other magnetic, optical, or electronic storage medium and a network, wireline, wireless or other communication medium (column 1, lines 22-63), wherein the DPCM is an electronic storage medium transmitting the data through the PSTN (network).

Conclusion

5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Curtis B. Odom whose telephone number is 571-272-3046. The examiner can normally be reached on Monday- Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Curtis Odom
November 28, 2006

JAY K. PATEL
SUPERVISORY PATENT EXAMINER